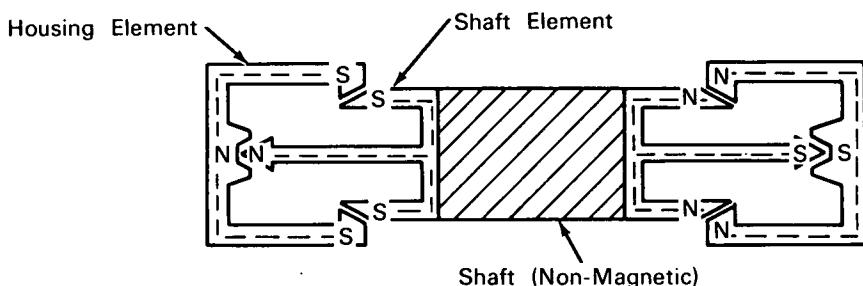


NASA TECH BRIEF



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Frictionless Bearing Uses Permanent Magnets



The problem: To develop a frictionless bearing for high speed, light load applications.

The solution: Incorporation of permanent magnets in the bearing design. The repulsion of like magnetic poles provides concentric support of the inner member so that no metallic contact occurs between the bearing surfaces.

How it's done: The bearing consists of a rotating shaft member and a stationary housing member. The housing member is a beveled permanent magnet, as is one end of the shaft member. The magnets are arranged so that, as the shaft member is inserted in the housing member, like poles of the magnets are in near contact. The shaft member rotates concentrically in the housing and is effectively suspended in the designed air gap by the repulsive forces of the adjacent bearing elements. The beveled construction of the magnetic pole elements produces a large surface area for the like poles and provides greater axial support for the shaft than a cylindrical design. Eccentric rotation is prevented automatically by the increased repulsive force present when the air gap between the housing and shaft is reduced. Under certain transient

conditions, the shaft may touch the housing and disrupt the normal flux paths. By making the housing in three or more segments, effective reluctance paths are provided for a return force to restore concentric rotation.

Notes:

1. The magnetic portions of both shaft and housing are designed with long magnetic paths to provide high residual magnetism.
2. Both ends of the magnets are used for support and provide a self-centering feature.
3. Design capability is limited to lightly loaded high-speed rotating shafts.
4. Inquiries concerning this innovation may be directed to:

Technology Utilization Officer
Manned Spacecraft Center
P. O. Box 1537
Houston, Texas, 77001
Reference: B65-10155

Patent status: NASA encourages commercial use of this innovation. No patent action is contemplated.

Source: North American Aviation under contract to Manned Spacecraft Center
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